

STRUCTURE AND BOLT PROTECTION APPARATUS

TECHNICAL FIELD OF THE INVENTION

This invention relates generally to construction and more particularly to a method for building a structure, a structure, and a bolt protection apparatus for use with
5 treated lumber.

BACKGROUND OF THE INVENTION

Treated lumber is used in various ways when building homes and other structures. In addition, treated lumber is often used for outdoor applications where ordinary
5 lumber would otherwise be susceptible to damage or destruction by insects. For many years, treated lumber has included arsenic as one of the chemicals used to treat lumber.

Recently, because of concerns over the potential
10 health effects of arsenic in treated lumber, federal regulations have limited the use of arsenic. For example, treated lumber containing arsenic generally may not be used for residential applications. Because the sill plate attached to the foundation of a home is often
15 chosen to be, or required to be, treated lumber, the regulation of lumber treated with arsenic has caused the need for new types of treated lumber to be used.

While a new type of treated lumber has been developed, the chemicals currently proposed for use with
20 the treated lumber are corrosive to steel and some other metals. The corrosiveness of the chemicals in new types of treated lumber presents problems for the construction industry where there is frequently pressure to reduce costs. While it is believed that stainless steel anchor
25 bolts, nuts, washers, and other hardware may be used in construction applications using the new type of treated lumber, such hardware is much more expensive than traditional steel hardware.

SUMMARY OF THE INVENTION

One aspect of the invention is a bolt protection apparatus for use with a bolt inserted into an opening in a piece of lumber. The bolt protection apparatus
5 comprises a first means for preventing at least a portion of the bolt from contacting the sidewall of the opening. The bolt protection apparatus further comprises a second means for assisting in fixing the position of a portion of the first means in the opening.

10 The invention has several important technical advantages. Various embodiments of the invention may have none, one, some, or all of these advantages without departing from the scope of the invention. The invention provides a cost-effective way to prevent metal bolts,
15 washers, and/or nuts from contacting treated lumber that may contain chemicals corrosive to such bolts, washers and/or nuts. The invention may be especially useful in residential construction applications where a treated lumber sill plate may be affixed to a slab foundation,
20 pier and beam foundation, or other type of foundation using bolts. In such an application, the invention may allow traditional steel hardware to be used for affixing the sill plate to the foundation using a bolt protection apparatus that is inexpensive and easy for construction
25 workers to attach.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention and the advantages thereof, reference is now made to the following descriptions taken in conjunction
5 with the accompanying drawings in which:

FIGURE 1 illustrates pieces of a structure that may be created in accordance with the present invention;

FIGURE 2 illustrates a portion of a structure that may be created in accordance with the present invention;
10 and

FIGURE 3 illustrates an alternative embodiment of a protective sleeve that may be used with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The preferred embodiment of the present invention and its advantages are best understood by referring to FIGURES 1 through 3 of the drawings, like numerals being
5 used for like and corresponding parts of the various drawings.

FIGURE 1 illustrates a portion of a structure 10 constructed in accordance with the invention. Structure 10 comprises foundation 12, anchor bolts 14, sill plate
10 16, protective sleeve 18, washer 22, washer 24, and nut 26. Other components may be added to structure 10 or some of the above components omitted without departing from the scope of the invention.

FIGURE 1 illustrates one application of the use of a
15 protective sleeve 18 in the context of the building of a structure. Specifically, protective sleeve 18 may be used to protect anchor bolt 14 from corrosion caused by chemicals in sill plate 16. Here, anchor bolts 14 are used to secure sill plate 16 to foundation 12.
20 Foundation 12 may comprise a concrete slab, a plurality of cinder blocks, a plurality of bricks, a plurality of concrete blocks, a plurality of foam blocks, a pier and beam foundation, and/or any other type of foundation.

Anchor bolts 14 may be affixed to foundation 12 in
25 any suitable manner. In this embodiment, anchor bolts 14 were inserted into foundation 12 (which is a concrete foundation) before the concrete had fully set. Similarly, in foundations that employ blocks, those blocks typically have openings therein which are filled
30 with concrete to provide support to the foundation. Pier and beam foundations may include beams constructed from blocks or concrete forms. In any of these examples,

anchor bolts 14 may be inserted into foundation 12 before the relevant concrete has fully set. Alternatively, in some applications, anchor bolts 14 may be placed into foundation 12 after the concrete has set. In such applications, a hole will typically be drilled in foundation 12 to insert the bolt and the bolt may be held in place, for example, using epoxy or by mechanical means. For the avoidance of doubt, the term "foundation" is meant to include basements that may be created, for example, out of cinder blocks with concrete poured into openings therein.

While in this embodiment, the protective sleeve 18 is used with anchor bolts 14, protective sleeve 18 could be used to protect any type of bolt from corrosive chemicals used to treat a piece of lumber such as sill plate 16. Moreover, bolts other than anchor bolts 14 could be used to attach sill plate 16 to foundation 12 without departing from the scope of the invention.

Protective sleeve 18 comprises a generally tubular first portion 19 which may prevent at least a portion of anchor bolt 14 from contacting the side wall of opening 20 in sill plate 16. In this embodiment, opening 20 has a generally circular shape but any shaped opening 20 may be used without departing from the scope of the invention. The illustrated circular opening 20 has one continuous sidewall, but openings of a different shaped cross-section may have multiple sidewalls. In this patent, the term "sidewall" is broadly intended to include all sidewalls of any shaped opening 20 where the opening has more than one sidewall.

In this embodiment, protective sleeve 18 further comprises a second portion 21 which may resist movement

of first portion 19 in a direction substantially perpendicular to opening 20 when protective sleeve 18 is inserted through opening 20. Thus, second portion 21 may assist in fixing the position of a portion of the protective sleeve 18 (here a portion of first portion 19) in the opening 20 when the protective sleeve 18 is inserted therein. For example, second portion 21 may resist upward movement of protective sleeve 18 in opening 20 when inserted as shown in FIGURE 1. As discussed below, second portion 21 may also resist downward movement relative to opening 20 especially when bonded to another object using an adhesive. In this embodiment, second portion 21 of protective sleeve 18 is integrally formed with first portion 19. However, second portion 21 may be a separate piece without departing from the scope of the invention. In addition, when second portion 21 of protective sleeve 18 is a separate piece, it could be bonded to first portion 19 or simply placed in contact therewith. In this embodiment, second portion 21 comprises a square washer with a width W of two inches. The inside diameter D of first portion 19 of protective sleeve 18 as well as the inner diameter of an opening in second portion 21 is one half inch. In this embodiment, the length L of protective sleeve 18 is three and a quarter inches. This length may be desirable for use with a 2x4 used for sill plate 16. A 2x4 is only one and one half inches thick typically. Sill plate 16 may be of any dimensions without departing from the scope of the invention. For example, 2x6's and 2x10's are sometimes used in construction applications for sill plate 16.

While specific dimensions have been provided, protective sleeves 18 with different dimensions may also

be used without departing from the scope of the invention. While second portion 21 of protective sleeve 18 comprises a square washer, a circular washer or any other shape of washer may be used without departing from the scope of the invention. In some embodiments, second portion 21 may be omitted from protective sleeve 18 and not used therewith.

In this embodiment, first portion 19 of protective sleeve 18 is cylindrical with a generally circular cross section. However, while first portion 19 of protective sleeve 18 will generally be tubular, the cross section does not necessarily need to be circular and any shaped cross section may be used without departing from the scope of the invention.

In this embodiment, protective sleeve 18 is made of plastic but could be made of rubber or some other suitable material. Preferably, protective sleeve 18 either does not corrode due to contact with chemicals used to treat sill plate 16 or corrodes very slowly due to contact with such materials. When placed over bolt 14, protective sleeve 18 may prevent at least a portion of bolt 14 from contacting the side wall of opening 20 in sill plate 16. Protective sleeve 18 may also prevent the entire portion of anchor bolt 14 which is surrounded by opening 20 from contacting the sidewall of opening 20. Thus, protective sleeve 18 may retard or prevent the corrosion of bolt 14 by preventing bolt 14 from directly contacting sill plate 16.

In this embodiment, a washer 22 may be placed over bolt 14 and protective sleeve 18. In some embodiments, washer 22 may rest on the top of protective sleeve 18. Washer 22 may be plastic, rubber, or another suitable

material which either does not corrode or corrodes very slowly in response to contact with chemicals used to treat sill plate 16. A metal washer 24 and metal nut 26 may then be used to more tightly affix sill plate 16 to foundation 12 using anchor bolt 14. Washer 22 may prevent contact between washer 24 and/or nut 26 and sill plate 16 to retard or prevent corrosion of washer 24 and/or nut 26. In some embodiments, washer 24 and/or nut 26 may be made of items other than metal.

10 In some embodiments, either washer 22, washer 24, and/or nut 26 may press down upon and compress the top surface of protective sleeve 18. Such compression may cause a seal to be created such that the interior of protective sleeve 18 is substantially sealed off at the top. When installed on bolt 14, second portion 21 of protective sleeve 18 may be affixed to foundation 12 and/or to bolt 14 using a suitable adhesive. This may substantially seal the bottom portion of protective sleeve 18. It may also prevent movement of protective sleeve 18 relative to opening 20. However, affixing second portion 21 is not necessary for this purpose.

20 In this embodiment, washer 22 comprises a square washer. However, any shaped washer may be used without departing from the scope of the invention. In addition, one or both of washers 22 and 24 may be omitted without departing from the scope of the invention. Additional washers may also be used.

30 In this embodiment, protective sleeve 18 is substantially rigid. However, protective sleeve 18 may be flexible without departing from the scope of the invention. In addition, first portion 19 of protective sleeve 18 is illustrated as a single tubular member in

FIGURE 1, but could be comprised of multiple tubular sections without departing from the scope of the invention. In such embodiments, multiple tubular sections may prevent at least portion of bolt 14 from
5 contacting the sidewall of opening 20 and sill plate 16.

While FIGURE 1 illustrates the use of a protective sleeve 18 in connection with the affixing of a sill plate 16 to the foundation 12 of a building, the invention may be used in other applications. Specifically, a
10 protective sleeve 18 may be used to shield a bolt used to connect a piece of lumber to any other object. For example, the sleeve 18 may be used to protect a bolt that connects multiple pieces of lumber together. In such an embodiment, protective sleeve 18 may have a length L
15 sufficient that the protective sleeve may pass through an opening in multiple pieces of lumber. Alternatively, multiple protective sleeves 18 could be used, with a different protective sleeve protecting the bolt in an opening in each piece of lumber respectively. Where
20 multiple protective sleeves are used in joining together two pieces of treated lumber, it may also be desirable to include a corrosion resistant or corrosion preventive washer in between the two pieces of lumber at the point where the protective sleeves come together. Such a
25 washer may be affixed to one or both of the protective sleeves using an adhesive and/or may be integrally formed with one or both tubular members.

Thus, the protective sleeve 18 of the present invention may be used in any application where it is
30 desirable to attach a piece of treated lumber to another object using a bolt.

To build a structure 10 using the invention, the following steps may be performed. First, one or more bolts 14 may be affixed to foundation 12. While protective sleeve may be placed on bolts 14 before or after affixing bolts 14 to foundation 12, protective sleeves 18 will more commonly be placed over bolts 14 after bolts 14 have been affixed to foundation 12.

Protective sleeve 18 may be placed over the protruding end of bolt 14. The protruding end is the end rising out of foundation 12. Where desired, an adhesive may be used to affix protective sleeve 18 to bolt 14 and/or foundation 12. In some embodiments which contain second portion 21 of protective sleeve 18, second portion 21 may be affixed to bolt 14 and/or foundation 12 to accomplish affixation of protective sleeve 18 to bolt 14 and/or foundation 12.

Next, sill plate 16 may be placed on foundation 12 with a combination of one or more bolts 14 and protective sleeves 18 passing through one or more openings 20 in sill plate 16. In this embodiment, two bolts each with protective sleeves 18 are used to affix sill plate 16 to foundation 12. The combination of the bolts 14 and protective sleeves 18 pass through openings 20 in sill plate 16. While two bolts 14 and protective sleeves 18 are used in this embodiment, more or less bolts 14 may be used without departing from the scope of the invention. In addition, a protective sleeve 18 may be used with some or all of the bolts 14 without departing from the scope of the invention.

Next, washers 22 and 24 may be placed over the protruding end of bolt 14 and/or the protruding end of protective sleeve 18. Next, a nut 26 may be attached to

the protruding end of bolt 14 and tightened to securely affix sill plate 16 foundation 12.

FIGURE 2 illustrates a portion of a structure 10 constructed in accordance with the invention. In FIGURE 2, sill plate 16 has been affixed to slab 12 using bolts 14 protected by protective sleeves 18. Washer 22, washer 24 and nut 26 have been attached to the protruding end of bolt 14 to affix sill plate 16 securely in place. A plurality of studs 28 have been attached to sill plate 16. The portion of structure 10 illustrated in FIGURE 2 may form a portion of the wall of a building or other structure.

FIGURE 3 illustrates an alternative embodiment of a protective sleeve 30 that may be used with the present invention. In this embodiment, protective sleeve 30 comprises a generally tubular structure with a plurality of fins 32.

Protective sleeve 30 again, has a circular cross section. However, any shaped cross section may be used without departing from the scope of the invention. In addition, while the illustrated embodiment of protective sleeve 30 comprises a single tubular member, multiple tubular members may be used to create protective sleeve 30 without departing from the scope of the invention. Where multiple tubular members 30 are used, such tubular members may be affixed to one another with an adhesive or simply placed against one another without departing from the scope of the invention.

Protective sleeve 30 comprises a plurality of fins 32. Fins 32 may be omitted without departing from the scope of the invention. In this embodiment, protective sleeve 30 may be used with a foundation 12 that is

constructed of concrete. The use of protective sleeve 30 in such an embodiment may be accomplished by sinking the end of protective sleeve 30 into the concrete in foundation 12 before the concrete has set. In such an
5 embodiment, after bolts 14 have been placed in the concrete 12, protective sleeve 30 may pass over the protruding end of the bolt 14 and protective sleeve 30 may itself be sunk into the concrete. Fins 32 (where included) may provide added stability to protective
10 sleeve 30 and may facilitate insertion of protective sleeve 30 into the concrete of foundation 12.

Although the present invention has been described in detail, it should be understood that various changes, substitutions and alterations can be made hereto without
15 departing from the sphere and scope of the invention as defined by the appended claims.

To aid the patent office, and any readers of any patent issued on this application in interpreting the claims appended hereto, applicants wish to note that they
20 do not intend any of the appended claims to invoke paragraph 6 of 35 U.S.C. §112 as it exists on the date of filing hereof unless "means for" or "step for" are used in the particular claim.